

Effect of a Training Program for Caregivers of Cardiac Patients on Their Knowledge and Practice about Cardiopulmonary Resuscitation to Prevent Sudden Death from Cardiac Arrest

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Abstract: This study was carried out on 30 employers who have cardiac patients from first degree & provide direct care to cardiac patients at the home & they are working in the Princess Nora Bint Abdul Rahman University. The aim of this study was to evaluate the effect of a training program for caregivers of cardiac patients on their knowledge and practice about cardiopulmonary resuscitation (CPR) to prevent sudden death from cardiac arrest. data were collected using two tools; 1- Structured questionnaire sheet and 2- The observational checklist. "Structured questionnaire sheet" is consisted of 22 questions related to socio-demographic characteristics, knowledge about sudden cardiac arrest, sudden pulmonary arrest and CPR. 2- The observational checklist were related to practice about cardiopulmonary resuscitation. The results of this study indicated that there are statistically significant ($P < 0.001$) improvement immediately after program implementation and throughout follow up regarding caregivers' knowledge and practice about cardiopulmonary resuscitation to prevent sudden death from cardiac arrest. Moreover, it was also found that statistically significant ($P < 0.001$) relation between caregivers' knowledge and practice and there is no statistically significant associations between the changes in the scores of either knowledge and practice and socio-demographic characteristics. Finally the program had succeeded in inducing statistically significant improvements of caregivers' knowledge and practice about cardiopulmonary resuscitation (CPR) to prevent sudden death from cardiac arrest. Therefore, it can be concluded from the results of the present study that this training program for caregivers had a positive impact on their knowledge and practice.

Key words: Care providers • Chest compressions • Rescue breathing • Basic life supports

INTRODUCTION

Sudden Cardiac death (SCD) is a sudden, unexpected death caused by loss of heart function (sudden cardiac arrest; SCA). SCA is the largest cause of natural death in the United States (US), causing about 325,000 adult deaths in the US each year. SCD is responsible for half of all heart disease deaths [1].

According to World health organization (WHO) [2] the total number of cardiac death in the world was 74.889 deaths from SCA. The incidence of sudden cardiac death

in a university hospital in Eastern Saudi Arabia was 59.2% of cases of all sudden death [3]. The prevention of cardiac arrest is the first link in the chain of survival. in clinically unstable inpatients early intervention by medical emergency teams significantly reduces the incidence of and mortality from unexpected cardiac arrest in- hospital and out - hospital [4].

Cardiopulmonary resuscitation (CPR) is a critical part of the management of cardiac arrest and prevention of sudden cardiac death. It should be started as soon as possible and interrupted as little as possible [5]. Family

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members and friends had patient at risk of sudden cardiac death they must know how to perform CPR [1]. So the aim of this study was evaluation of effect of training program for caregivers of cardiac patients about CPR to prevent SCD.

MATERIALS AND METHODS

Research Design: The design of this study is quasi-experimental design done to evaluate the effect of a training program for caregivers of cardiac patients on their knowledge and practice about CPR to prevent sudden death from cardiac arrest.

Setting: The study was conducted at Princess Nora Bint Abdul Rahman University in the health science lab. of Health Science and Rehabilitation College, using resusci Anne Full Body Skill Reporter w/ Hard Case (w 19607).

Inclusive Criteria : The caregivers were adults (up to 55 years) & not old people.

The relatives of caregivers were the patients with arrhythmias, myocardial infarction, & angina only, not all cardiac patients.

Tools: Two tools were used in the study. Tool I “structured questionnaire sheet” It was developed and constructed by the researcher based on the review of related literature to evaluate caregivers’ knowledge about sudden cardiac arrest and CPR(Pre and post knowledge questionnaire). Tool II“ An observation checklist “was developed by researcher to evaluate caregivers' practice related to cardiopulmonary resuscitation.

Process of the Study: It was consisted of four phases: first phase was assessment of caregivers’ knowledge and practice about cardiopulmonary resuscitation to prevent sudden death from cardiac arrest after taking their permissions and pilot study. Second phase was implementation of a training program for caregivers’ knowledge and practice about cardiopulmonary resuscitation to prevent sudden death from cardiac arrest. Third & fourth phases were evaluation of the effect of the implemented training program on the knowledge and practice of caregivers of cardiac patients about cardiopulmonary resuscitation to prevent sudden death from sudden cardiac arrest immediately and after 3 months from the beginning the implementation of the program.

Table 1: Socio-demographic characteristics of caregivers;

Items	n= (30)	%
Age of caregivers:		
20-<30 years	12	40
30-<40 years	8	26.7
40-<50 years	8	26.7
50+≤ 55 years	2	6.7
Qualification:		
1- an ignorant	0	0
2- primary school	2	6.7
3-Preparatory school	0	0
4- secondary school	5	16.7
5- Bachelor degree	10	33.3
6- Diploma	0	0
7- Master	5	16.7
8- PhD	8	26.7
Relationship to cardiac patient:		
1- Mother	9	30
2- Father	13	43.3
3- Husband	8	26.7
4- Son	0	0
5- Daughter	0	0
Age of their patients:		
40- <50 years	6	20
50-<60 years	2	6.7
60-<70 years	12	40
70-<80 years	9	30
80-<90 years	1	3.3
90+ years	0	0
Duration of cardiac disease:		
<1 years	1	3.3
1-<5 years	2	6.7
5-<10 years	7	23.3
10-<20 years	9	30
20+ years	11	36.7
CPR courses:		
Yes	0	0
No	30	100
Medical Diagnosis of their patient:		
1- Arrhythmias	4	13.3
2- Myocardial infarction	18	60
3- Angina	8	26.7

RESULTS

Table (1) shows the socio-demographics characteristics of caregivers. About 40% of caregivers’ age were 20 years and less than 30 years,26.7% of them were 30 years and less than 40 years old and 26.7% of them were 40 and less than 50 years old. As regards to their qualification One third of studied caregivers had bachelor degree, 26.7% of them had PhD degree, and 16.7% of them had master degree. As regards to relationship of studied caregivers to their cardiac patients were 43.3% of their fathers, 30% of their mothers and 26.7% of their husband. About 70% of their patients’ age had 60 years and less than 80 years old and the duration of their cardiac disease was 66.7% of their patients from

10 years to more than 20 years ago. Also 60% of their patients had myocardial infarction. All of the studied caregivers did not have any previous training course in SCD and CPR.

Table (2): Shows the differences in caregivers' knowledge regarding sudden cardiac arrest throughout the program intervention. The results indicated improvements of caregivers' knowledge in various areas of sudden cardiac arrest and their total score. These improvements were statistically significant ($p < 0.001$). The most prominent improvement was in the score of knowledge about causes of Sudden Cardiac Arrest (SCA). It reached 100.0% in the immediate post-test. Meanwhile, the first follow-up scores tended to decline, compared to the immediate post-test especially in knowledge about complications, signs and symptoms, risk factors and definition of SCA (60.0, 63.3, 73.3 and 76.7%, respectively). The levels were significantly higher than the pre-program levels (pretest).

Table (3): Shows the differences in caregivers' knowledge regarding pulmonary arrest throughout the program intervention. The results indicated improvements of caregivers' knowledge in various areas of pulmonary arrest and in their total score. These improvements were statistically significant ($p < 0.001$). The most prominent improvements were in the scores of knowledge about causes of pulmonary arrest. They reached 96.7.0% in the

immediate posttest. Moreover the percentages of satisfactory level in all knowledge areas improved in the posttest. Meanwhile, the first follow-up after 3 months scores tended to decline, compared to the immediate post program, especially in knowledge about signs and symptoms, definition and causes (53.3, 63.3 and 73.3%, respectively). The caregivers' knowledge levels were significantly higher than the preprogram level (pretest).

Table (4): Shows differences in caregivers' knowledge regarding CPR throughout the program intervention. The results indicated statistical significant improvements of caregivers' knowledge in various areas of definition, causes, complications and survival chain and their total scores ($p < 0.001$). The most prominent improvement was in the knowledge scores about complications and general right instructions for CPR reaching 100.0% in the immediate posttest. Meanwhile, the first follow-up scores tended to decline, compared to the immediate posttest, especially in knowledge about especially causes, definition, Survival chain, Complications, General right instructions for CPR (66.7, 70.0, 70.0, 76.7 and 83.3% respectively). Their levels were significantly higher than the pre-program levels.

Table (5): Demonstrates the differences in the total score of caregivers' practice regarding CPR throughout the program intervention. All studied caregivers (100.0%) had satisfactory level of practice related to all items of

Table 2: Differences in caregivers' knowledge regarding sudden cardiac arrest (SCA) throughout the program intervention.

	Time						X ²	P-value
	Pre test		Immediate post test		After 3-months			
	N	%	N	%	N	%		
Caregivers' knowledge about								
- Definition	3	10	27	90	23	76.7	62.412	<0.001*
- causes	1	3.3	30	100	27	90	96.761	<0.001*
- Risk factors	2	6.7	29	96.7	22	73.3	75.327	<0.001*
- Signs and symptoms	1	3.3	26	86.7	19	63.3	60.822	<0.001*
- Preventive measures	1	3.3	27	90	24	80	60.278	<0.001*
- Complications	2	6.7	24	80	18	60	56.711	<0.001*
Total	1	3.3	25	83.3	21	70	69.597	<0.001*

Statistically significant (*)

Table 3: Differences in caregivers' knowledge regarding pulmonary arrest throughout the program intervention.

	Time						X ²	P-value
	Pre test		Immediate post test		After 3-months			
	N	%	N	%	N	%		
Caregivers' knowledge about								
- Definition	0	0.0	24	80.0	19	63.3	63.570	<0.001*
- causes	0	0.0	29	96.7	22	73.3	88.851	<0.001*
- Signs and symptoms	0	0.0	23	76.7	16	53.3	49.290	<0.001*
Total	0	0.0	26	86.7	17	56.7	67.433	<0.001*

(*) Statistically significant

Table 4: Differences in caregivers' knowledge regarding CPR throughout the program intervention.

	Time						X ²	P-value
	Pre test		Immediate post test		After 3 months			
	N	%	N	%	N	%		
Caregivers' knowledge about								
- Definition	0	0.0	25	83.3	21	70.0	61.944	<0.001*
- Causes	0	0.0	26	86.7	20	66.7	58.560	<0.001*
-Complications	0	0.0	30	100.0	23	76.7	94.836	<0.001*
-Survival chain	0	0.0	25	83.3	21	70.0	61.944	<0.001*
-General right instructions for CPR	0	0.0	30	100.0	25	83.3	99.832	<0.001*
Total score of knowledge of CPR	0	0.0	27	90.0	18	60.0	70.615	<0.001*

Table 5: Differences in the total score of caregivers' practice regarding CPR throughout the program intervention

	Time						X ²	P-value
	Pre test		Immediate post test		After 3 Months			
	N	%	N	%	N	%		
Caregivers' practice about								
Primary survey	0	0.0	29	96.67	24	80.00	92.260	<0.001*
Chest compressions	0	0.0	30	100.00	27	90.00	96.458	<0.001*
rescue breathing	0	0.0	30	100.00	28	93.3	110.455	<0.001*
Total number of caregivers in relation to total score	0	0.0	30	100.00	23	76.7	94.836	<0.001*

Table 6: Percent changes in the total scores of caregivers' knowledge regarding CPR throughout the program intervention

@% Change in score	Minimum	Maximum	Mean	SD
Post-Pre	109.38	212.50	182.3	28.8
FU ₁ -Pre	-21.88	206.25	51.9	12.9

@% Change post Pre= 100 X (Post - Pre) / (Pre).

N:B:- First follow up = FU₁

Table 7: Percent changes in the total scores of caregivers' practice regarding CPR throughout the intervention program

@% Change in score	Minimum	Maximum	Mean	SD
Post-Pre	1183.30	1550.0	1381.7	100.6
FU ₁ -Pre	683.3	1250.0	1139.4	165.6

@% Change post Pre= 100 X (Post - Pre) / (Pre).

CPR practice in the immediate posttest phase of the program. The only exceptions were related to primary survey in the immediate phase (96.67%). The levels have shown some declining in the first follow-up, especially in relation to practice of primary survey (80.0%). All phases have shown statistically significant improvements, compared to pre-program levels (P<0.001*).

Table (6): shows the percent changes in the total scores of caregivers' knowledge regarding CPR throughout the program intervention. The highest percentages of improvement were in caregivers' knowledge, between the immediate posttest and the pre-program level (182.3±28.8). Conversely, the lowest percentages of improvement were in their knowledge, especially between the first follow-up and the pre-program level (51.9±12.9%).

Table (7): shows the percent changes in the total scores of caregivers' practice regarding CPR throughout the intervention program. The highest percentages of improvement were in practice, reaching (1381.7±100.6%) between the immediate posttest and the pre-program level. Conversely, the lowest percentages of improvement were in practice especially, between the first follow-up and the pre-program level (1139.4±165.6%).

Table (8): Shows Comparison between caregivers' mean score and standard deviation of studied caregivers in relation to CPR throughout the program intervention according to their age. No statistical significance difference was found between caregivers' knowledge or practice and their age groups. caregivers of age category 50 years to 55 years had the highest percent change in their score of knowledge between the immediate post

Table 8: Comparison between caregivers' mean score and standard deviation of studied caregivers in relation to CPR throughout the program intervention according to their age

% Change in score	Age (years)				ANOVA (F)	P-value
	20-<30 MEAN± SD	30-<40 MEAN± SD	40-<50 MEAN± SD	50+=55 MEAN± SD		
Knowledge:						
Post-Pre	176.6±27.4	188.0±31.2	192.7±12.3	196.1±14.4	2.583	.062
FU ₁ -Pre	112.2±68.1	145.8±62.8	86.9±53.6	164.1±2.2	2.378	.079
Practice:						
Post-Pre	1412.5±99.5	1364.8±116.2	1377.8±67.2	1383.4±23.5	1.390	.266
FU ₁ -Pre	1111.1±190.9	1166.7±163.9	1186.1±40.0	1225.0±11.7	1.711	.179

Table 9: Comparison between caregivers' mean score and standard deviation of studied caregivers in relation to CPR throughout the program intervention according to duration of cardiac disease of their patients

% Change in score	Duration of cardiac disease					t-test	P-value
	<1 MEAN± SD	1-<5 MEAN± SD	5-<10 MEAN± SD	10-<20 MEAN± SD	20+ MEAN± SD		
Knowledge:							
Post-Pre	109.4±0	188.3±20.9	187.3±26.8	181.9±28.9	184.9±26.5	1.913	.100
FU ₁ -Pre	-219±0	75.0±110.5	145.1±58	114.1±5.3	119.7±52.0	1.691	.183
Practice:							
Post-Pre	1183.3±0	1400.0±94.3	1376.2±130.1	1387.0±101.3	1395.5±76.4	1.060	.397
FU ₁ -Pre	783.3±0	1158.4±58.9	1200.0±31.9	1094.4±207.5	1166.7±161.6	1.825	.156

Table 10: Partial correlation of caregivers' knowledge and practice scores related to CPR adjusted for the effect of the program intervention

Knowledge and practices scores in	Pearson partial correlation coefficient	P-value
-Primary survey	.360	.051
-Chest compressions	.293	.116
-Rescue breathing	.470	.009*
Total knowledge and practice	.441	.015*

program and the preprogram levels (196.1±14.4%). Meanwhile, caregivers of 20 to less than 30 years old group had the highest practice score percentage. This gain was between the immediate post program and the pre-program levels (1412.5±99.5%).

Table (9): Shows Comparison between caregivers' mean score and standard deviation of studied caregivers in relation to CPR throughout the program intervention according to duration of cardiac disease. As evident in this table, no statistically significant associations could be revealed between changes in caregivers' knowledge and practice scores and duration of cardiac disease of their patients, $p>0.05$. Meanwhile, the most prominent improvements were mostly in the caregivers' scores of those with 1 to less than 5 years duration of cardiac disease of their patients.

Table (10): Shows partial correlation of caregivers' knowledge and practice scores related to CPR adjusted for the effect of the program intervention. It demonstrated statistically significant positive correlation between caregivers' knowledge and practice, irrespective of the

effect of the intervention program. Significant correlations were found in relation to knowledge and practice about rescue breathing ($r=.470$) and total knowledge and practice.

DISCUSSION

Sudden cardiac arrest (SCA) is a leading cause of death in the United States and Canada. In the United States, each year ~330 000 people die of coronary heart disease out of the hospital or in emergency departments. Of these, >150 000 SCAs occur out of the hospital [6, 7]. CPR is part of the chain of survival, which includes early access (to emergency medical services), early CPR, early defibrillation and early advanced care[8]. CPR is taught to the general public in order to increase the chance to CPR being performed in the crucial few minutes before emergency personnel are available [9]. The initial care in the first critical minutes after SCA, including performance of CPR and potential use of an automated external defibrillator (AED), depends on the actions of people near

the victim. Although the majority of cardiac arrests occur in the home, the presence of trained and willing rescuers and the availability of an AED are critical whether the cardiac arrest occurs in a public space or at home [10]. CPR is an important medical procedure which is needed for individuals who face sudden cardiac arrest. It is a combination of rescue breathing and chest compressions which is delivered to the victims who are thought to be in cardiac arrest [11]. So the aim of the study was to evaluate the effect of a training program for caregivers of cardiac patients on their knowledge and practice about CPR to prevent sudden death from cardiac arrest.

The results of the present study revealed that 40% of caregivers' age were from 20 to less than 30 years old while 53.4% of their age were from 30 to less than 50 years old. These results might be due to that 26.7% of them had PhD degree, and 16.7% of them had master degree and one third of studied caregivers had bachelor degree these results might be due to studied place which is university campus.

Findings of the present study indicated that relationship of studied caregivers to their cardiac patients were 43.3% of their fathers, 30% of their mothers and 26.7% of their husband these results might be due to 53.4% of caregivers' age were from 30 years to less than 50 years.

The results of the present study revealed that 70% of their patients' age had 60 years old and less than 80 years and the duration of their cardiac disease was 66.7% of their patients from 10 years to more than 20 years ago. Also 60% of their patients had myocardial infarction. These results were supported by Jeremy *et al.* [12] who stressed that myocardial infarction (MI) is common occurrence in the "old old" with subsequent morbidity and mortality prognosis comparable to that of recognized MI and the prevalence and incidence and prognosis of recognized and un recognized MI was assessed in an 8 years prospective study of the incidence of cardiovascular disease in subjects with evidence of MI was 8.8\ 100 person- year versus 4.7 among control subjects ($p=0.002$). And history of MI alone in age group (75 to 85 years at entry, mean 79 years) is also associated with an increased risk of MI, suggesting the need for better diagnostic markers of Myocardial ischemia in the old.

As regard to caregivers' knowledge and practice about SCA, pulmonary arrest and CPR practice to prevent sudden death before program implementation, in the current study, almost all of studied caregivers had statistically unsatisfied total basic knowledge about SCA,

pulmonary arrest as a disease, CPR as general rights for instruction of CPR and CPR practice as primary survey, chest compression and rescue breathing this results might be due to that all of the caregivers didn't attended any in-service training program related to sudden cardiac death and CPR and their knowledge during school study years might be insufficient for such a specialized service or forgotten. There is not CPR training course by media awareness and educate the university and they had busy work in university which did not allow to attend courses about CPR.

This finding was in agreement with Rasmus and Czekajlo [13] who reported that the majority of the surveyed population assessment of their CPR ability was inadequate and the surveyed population believed that CPR training needs to be expanded and improved. Taking into consideration results of the CPR knowledge assessment questions it can be concluded that CPR knowledge in Poland is low and a standardized curriculum for CPR training is needed. Mover over In a recent public opinion survey, about 45% of respondents didn't know that cardiac arrest is a leading cause of cardiovascular death and approximately 94% said that raising awareness about it is important. Research can help us better understand cardiac arrest's causes and increased public awareness, CPR training and access to automated external defibrillators (AEDs) can save tens of thousands of lives each year[13]. In additional to Reder *et al.* [14] the knowledge of cardiac arrest and required basic life support (BLS) has been found to be insufficient and even the school teachers lack such knowledge and skills, in most developed countries, even USA. CPR remains a set of difficult psychomotor skills that is challenging to teach to the lay public.

In the present study immediately after program implementation a statistically significant improvement in caregivers' knowledge about SCA, pulmonary arrest as a disease and CPR practice as caregivers' practice related to primary survey, chest compression and rescue breathing were found.

This improvement may be due to effect of the in-service training program which did not only stress the acquisition of knowledge of SCA and Pulmonary arrest but also stresses on practical training to gain information and change practices using adequate sessions, different teaching strategies as, discussion, lecture, demonstration and redemonstration, using media as, poster, booklet, pamphlets as well as availability of sufficient materials and supplies needed for achievement of the work. Motivate the studied caregivers to achieve the desired objectives

through rewarding and acknowledgement of positive attitude and discouragement of negative attitude. All participated caregivers had taken booklet, pamphlets as handouts for the program content. Recurrent reinforcement of knowledge and practice was done by the researcher in each session.

American Heart Association Guidelines for CPR and ECC” emphasize three important concepts: high-quality CPR is an important determinant of survival from SCA, more victims of out-of-hospital SCA should receive bystander CPR, and CPR must be performed effectively by bystanders and healthcare providers [15]. CPR is critical to the survival of victims of cardiac arrest. Individuals with CPR training are more likely to deliver the lifesaving intervention to cardiac arrest victims. Furthermore, those with training perform higher quality CPR to victims of cardiac arrest and increase survival rates. Unfortunately, not enough people are able to deliver effective CPR. Because 96% of children ages 14-17 attend a public or private school, CPR training in high schools can teach a substantial portion of the population how to deliver this lifesaving technique and help increase the likelihood that individuals suffering a cardiac arrest will receive high quality CPR. Training students in CPR will fill schools, as well as entire communities, with lifesavers. Additionally, emergency response dispatchers can play a vital role in assisting bystanders in delivering high quality CPR while waiting for emergency personnel to arrive [16].

The increasing the percentage of the population trained in CPR is an integral part of an overall strategy to improve community response to out of hospital cardiac arrest (OHCA). Schools provide excellent access to a large part of the community: among 5- to 14-year-olds, compliance with required attendance is nearly universal at 97.4%; among 15- to 19-year-olds, compliance is 76.5%. Therefore, over time, a significant percentage of the overall community will receive training. Programs in which students can share materials used in school-based programs at home with family members can further increase the program’s yield in terms of the total number of members of the community trained per unit of class time expended [17, 18].

This finding was in accordance with Cave *et al.* [16] reported that the International Liaison Committee on Resuscitation strongly recommended that CPR training be incorporated into the standard school curriculum. That recommendation was based in part on the opinion that over the long term, children trained in CPR contribute significantly to the number of adults trained in CPR in the community. The expected direct benefit of increasing the

number of people trained to perform CPR is to increase the likelihood that a victim of OHCA promptly receives CPR. This assumes that bystanders trained in CPR are more likely to take action than those who are not trained.

Since that time, there has been an increased interest in legislation that would mandate that school curricula include training in CPR or CPR and automated external defibrillation. Laws or curriculum content standards in 36 states (as of the 2009–2010 school year) now encourage the inclusion of CPR training programs in school curricula [16].

These results were congruent with Shahab[19] who had similarly reported statistically significant differences between pre-and post-tests as regard subjects’ knowledge and practice towards prevention of sudden death from sudden cardiopulmonary arrest. Also these finding was in agreement with Farhan *et al.* [20] and Cleary and Hapell [21], who stated that after implementation of the program, it is obvious that the program had achieved its desired objectives. Where the family members’ knowledge and practice significantly improved. In addition to Hend *et al.* [22] Regarding CPR performance, the present study proved that nurses performance was very poor in all performance items pre the program which has been strongly increased immediately post the program and then decreased again one month later with the lowest score of performance items at one month post the training program.

Moreover, these results were on the same line with Herdrich and Lindsay [23]. Those authors asserted the positive effect and high impact of the teaching program on subjects’ knowledge after implementation of the program. Moreover, improvement of subjects’ knowledge after attending the program was explained by McClement *et al.* [24] who mentioned that when knowledge scores of almost all participants improve after program implementation, compared to before the program implementation, this indicates that the participants were highly interested in the program contents. Additionally, the media and methods of teaching, which were employed, were certainly successfully used in stimulating their enthusiasm.

In the present study, in the first follow-up test, after three months from the program implementation studied caregivers’ total knowledge scores and practice declined, comparing to the immediate posttest. Although it was still significant improved than pretest. Similar findings had been previously interpreted by Rosemary [25] who had stated that some of the theoretical knowledge, which was not utilized in regular practice, is expected to be lost with the passage of time.

These findings were agreement with those Puoane *et al.* [27] and Farhan [20] who found that caregivers' knowledge and practice in follow-up tests declined to satisfactory level and showed a drop in relation to immediate post-test scores.

Resuscitation skills are complex psychomotor skills that need to be performed in a specified sequence within a very limited time frame. Hence, the most important problem in resuscitation education is the rapid fall off in skills and knowledge following initial training. The children showed highly significant improvement in knowledge after CPR training and retention of knowledge and skills of CPR after 3 months period than old adult [19].

As for the percent changes in the scores of studied caregivers' knowledge and practice throughout the program phases in relation to their age and duration of cardiac disease of their patients, in the present study no statistical significance relation were found. This finding points to the successful effect of the implemented training program about SCA& CPR all caregivers, irrespective of their age and duration of cardiac disease of their patients. This result was in agreement with Shahab [19] who reported that there was no correlation of age, gender. Grainger and Bolan [28] stated that knowledge has been developed and established as a systemic and generalized knowledge base for practice. They added, knowledge is necessary for nurses to improve their practice. This is based on the recognition that caregivers' knowledge production must also be viewed in conjunction with practice itself, as practice invades not only the use of knowledge but also gaining of knowledge and the application of that knowledge through practice.

The findings of the present study revealed that there were a statistically significant mild positive correlation between caregivers' knowledge and practice scores which mean when caregivers' knowledge improved their practice improved. This finding was supported by Radzysinski [29] who stated that not only scientific knowledge but also experience could affect the overall quality performance.

Finally, the results of the present study confirmed that standardized well-defined protocols of people, education along with quality improvement surveillance system, are needed to ensure quality performance [16].

CONCLUSION

The results of the present study revealed statistically significant improvement of caregivers' knowledge and practice about SCA, Pul. Arrest and CPR to prevent sudden death from cardiac arrest throughout the program phases.

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